Novel Ionic Networks derived from the Protonation of Poly(Propylene Imine) Dendrimers with Carboxylic Acid-Telechelic PEG's

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Nowadays, supramolecular chemistry is becoming one of the most active topics of research related to the material science field [1]. Supramolecular chemistry is focused mainly in the use of well-defined molecules or macromolecules and intermolecular forces to create larger, more complex chemical systems with new and unique properties. There are some strategies to prepare supramolecular polymer networks using hydrogen and metal-ligand bonding [2,3]. In this study, we report how to create "supramolecular ionic networks" using dendritic molecules and carboxylic acid-telechelic PEG's. The fluid-like materials, held together through non-covalent electrostatic interactions, are easily prepared from a diverse set of available starting materials, facilitating the design of new ionic materials. The synthesis and characterization of new ionic networks of the ammonium salts of the commercially available poly(propylene imine) (G=1 and G=2) dendrimers and two commercial poly(ethyleneglycol)biscarboxymethyl ether are reported.

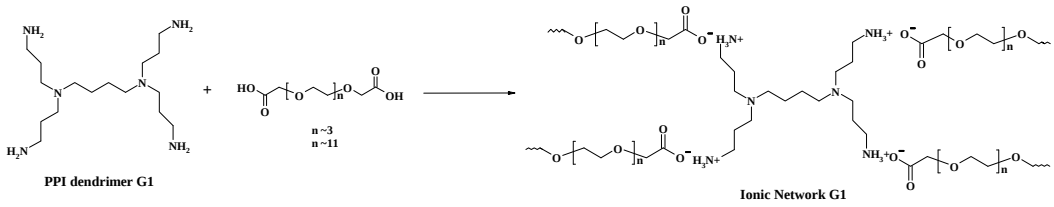

Figure 1. Formation of the ionic network using PPI dendrimer G1 with DiCOOH-PEG's

The ionic networks have been evaluated by DSC, ATR-FTIR and ^{1}H-NMR spectroscopy. The thermal degradability of the ionic networks formed with varying number of generation of the dendrimer as well the molecular weight of carboxylic acid-telechelic PEG was studied by TGA. Finally, we investigated the thermal rheological (dynamic viscoelastic) behaviour of dendrimeric ionic networks formed.

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